CHAPTER 2
Geomorphology

CLIMATE

The climate in south Florida is subtropical and humid. The winters are relatively dry and the summers are wet, with most of the rain occurring as late afternoon thunder storm showers. Average seasonal temperatures range from 60° F in the winter to 83° F in the summer (based on temperature measurements 1965–2000 in **Appendix A**). The annual average rainfall is 55 inches (This is the average of the rainfall for 1995 from all the stations used in the model see **Chapter 4**). Rainfall is the primary source of water into the hydrologic system, while evapotranspiration (ET) is the primary loss. There are very few data collection stations locations that measure evapotranspiration directly. The SFWMD has adopted the "South Florida Water Management District Simple Method" (Irizarry-Ortiz 2003) to estimate reference evapotranspiration. Based on the location and temperature data gathered from each rainfall station, a potential evapotranspiration is calculated. The Agricultural Field Scale Irrigation Requirements Simulation (AFSIRS), which was developed Smajstrla (1990) was used to estimate the maximum potential evapotranspiration rate for each crop type. The mean max evapotranspiration rate is 22 inches/year. The process is described in more detail in **Chapter 4.**

TOPOGRAPHY AND SURFACE WATER FEATURES

Land surface elevations in the model area range from -1 feet (in Lake Okeechobee) to 204 feet above the National Geodetic Vertical Datum of 1929 (NGVD). The highest elevations are on Lake Wales Ridge in Highlands County. In Indian River, Martin and St Lucie counties, the land surface is flat with the average elevation 23 feet (The Allapattah Flats) (**Figure 3**). Traveling westward, land surface rises 30 to 50 feet along the Holopaw-Indian Town Ridge to the hilly wetland terrain of the Kissimmee Valley on either side of the Kissimmee River. In the Northwestern portion of the model, there are two ridges. The narrow Avon Park Bombing Ridge has a maximum elevation of 132 feet NGVD: The larger Lake Wales Ridge has a maximum elevation of 204 feet NGVD. The Lake Wales Ridge features a series of north-south trending sand ridges separated by valleys (Yobbi 1996). There are many lakes and ponds along the Lake Wales Ridge. In portions of the Lake Wales Ridge, there are many karst features, sinkholes and sinkhole lakes (Yobbi 1996). The Lake Wales Ridge serves as a recharge area to the Surficial Aquifer System and to the Floridan Aquifer System. South of Lake Wales Ridge is the DeSoto Slope/Caloosahatchee Incline. North of Lake Okeechobee is the Lake Okeechobee Prairie with elevations of 20 to 40 feet NGVD. Due to the large number of lakes and ponds in the model area, many with little or no depth and lake level information, only those lakes over 30 acres were included in the model.

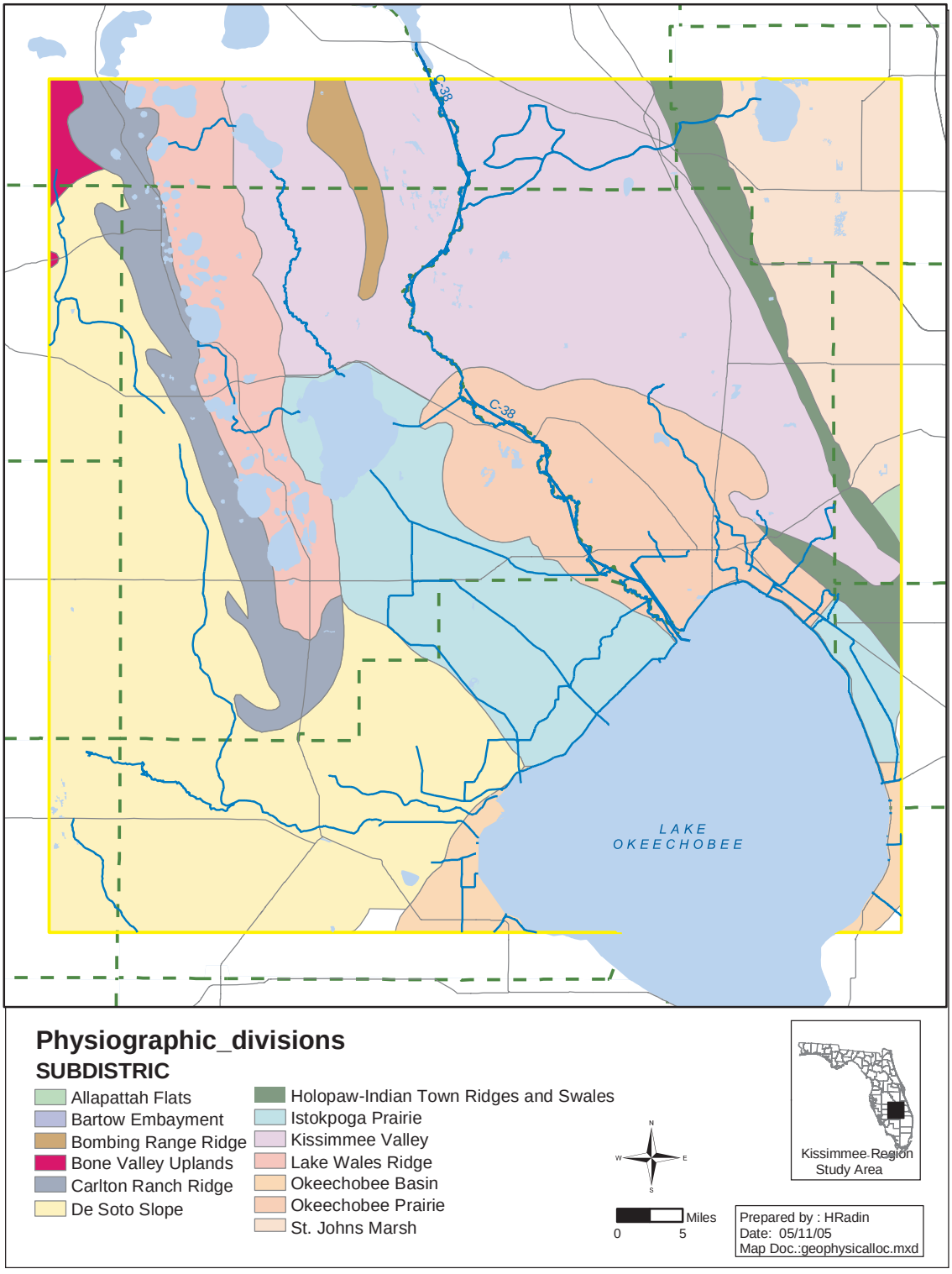

Figure 3. Physiographic Divisions in the Lower Kissimmee Groundwater Model Area. Shape File from SJRWMD (after Brooks 1981).

The topography data for the model were collected from three sources:

Highlands County Elevations (ew29_g100) is a grid of elevation data (**Figure 4**), created by T. Liebermann (SFWMD Communication June 2003), from contours, in NGVD29, includes all of Highlands County. This grid was derived from USGS 5 foot contours after editing to remove roads and other man made contours. Water bodies have been superimposed as flat surfaces. The cell size is 100 feet. Vertical datum is NGVD29.

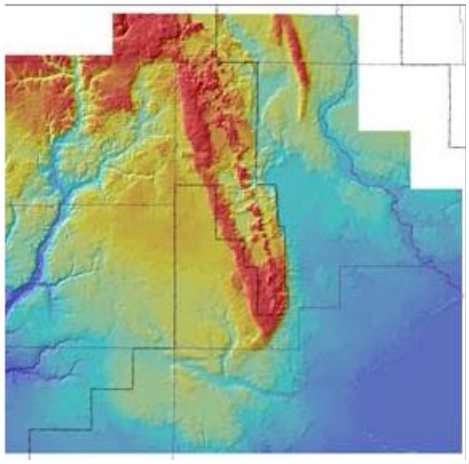

Figure 4. Highlands County Elevation Data (T. Liebermann, SFWMD Communication April 2004).

LFHYPG29 – (located in SFWMD GISDATABASE) SWFFS Topography – NGVD29 – GRID. This dataset was developed for the Southwest Florida Feasibility Study (SWFFS)[1].

LFHYP24K – (located in SFWMD GISDATABASE). This dataset is a subset of the USGS National Elevation Dataset (NED), which provides seamless 1:24,000-scale Digital Elevation Model (DEM) data for the conterminous U.S. (dem_24k_grid_100ft_cell.)

These raster files were merged and resampled to 2,640 ft^2 cells for inclusion in the model. **Figure 5** shows the aerial surface topography for the model area.

[1] Southwest Florida Feasibility Study http://www.evergladesplan.org/pm/studies/swfl.cfm

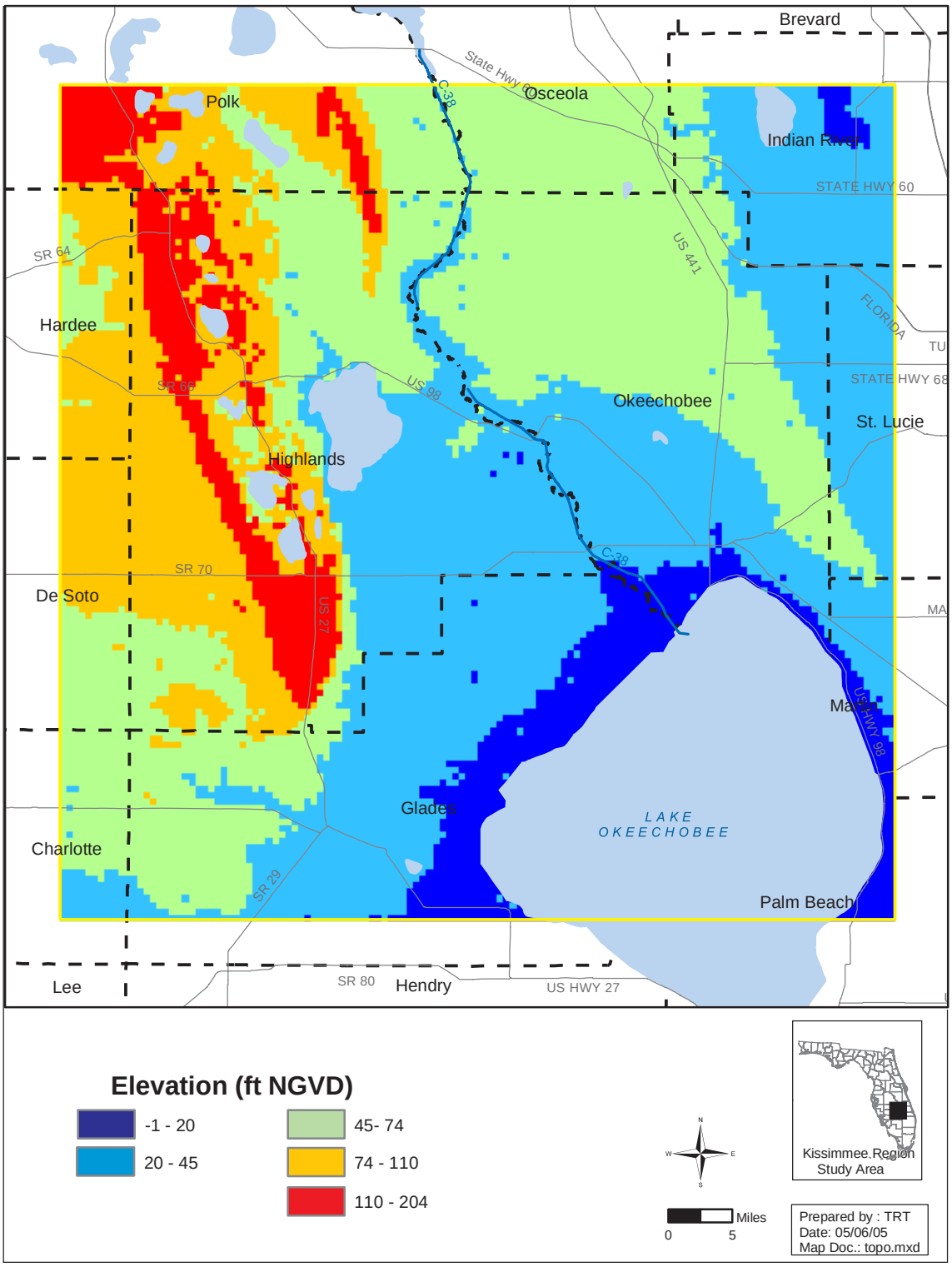

Figure 5. Topography.

The bathymetry data for Lake Okeechobee were superimposed on the topography. Other large water bodies were superimposed on the topography to reflect the bottom elevations of the lakes or rivers.

The Lower Kissimmee Basin includes the tributary watersheds of the Kissimmee River between the outlet of Lake Kissimmee (S-65) (see **Figure 6**) and Lake Okeechobee. The Kissimmee River and Lake Istokpoga are the major surface water features in the basin (**Figure 7**). Fisheating Creek and Taylor Creek/Nubbin Slough are prominent surface water features in the southern region of the Kissimmee basin Planning Area. Fisheating Creek marks the southernmost extent of the Kissimmee basin Planning Area and flows into Lake Okeechobee. Taylor Creek/Nubbin Slough is the site of one of the priority cleanup projects identified as part of the Lake Okeechobee Surface Water Improvement and Management (SWIM) Plan and Everglades restoration projects. There are no known large uses of water from either creek.

The Kissimmee River was originally 103 miles in length until it was channelized in the 1960s into a 56-mile canal (C-38). The Kissimmee River was divided into five pools (pools A-E) by a series of combined locks and spillways. The water level in each of these pools is regulated according to a regulation schedule. The Kissimmee River Restoration Project, underway, will backfill approximately 22 miles of the C-38 Canal, demolish two water control structures and recarve approximately 9 miles of river channel. These modifications will redirect flows through the historic river channel and restore ecological functions to the river/floodplain system. Backfilling began in the 1990s midway between S-65A and S-65B. There are areas north and south of Phase I to be backfilled. Information on the Kissimmee River Restoration effort is available from the SFWMD Web site: http://www.sfwmd.gov/org/erd/krr/.

Lake Istokpoga at 44 square miles is the fifth largest lake in Florida. The lake is connected to the Kissimmee River via the Istokpoga Canal and the C-41A Canal. The Istokpoga Canal consists of two reaches, one upstream and one downstream of the G-85 Structure. The Istokpoga Canal has minimum flow into the Kissimmee River through the S-68 structure, since the G-85 structure is no longer operational.

The main outlet for Lake Istokpoga is S-68, which regulates discharges from the lake to the C-40, C-41 and C-41A canals. The C-41A Canal discharges into the Kissimmee River below S-65E, passing through two additional water control structures (S-83 and S-84). The C-41 and C-40 canals discharge water from Lake Istokpoga to Lake Okeechobee. The C-40, C-41 and C-41A canals and associated structures make it possible to regulate the stages of Lake Istokpoga for irrigation water supply.

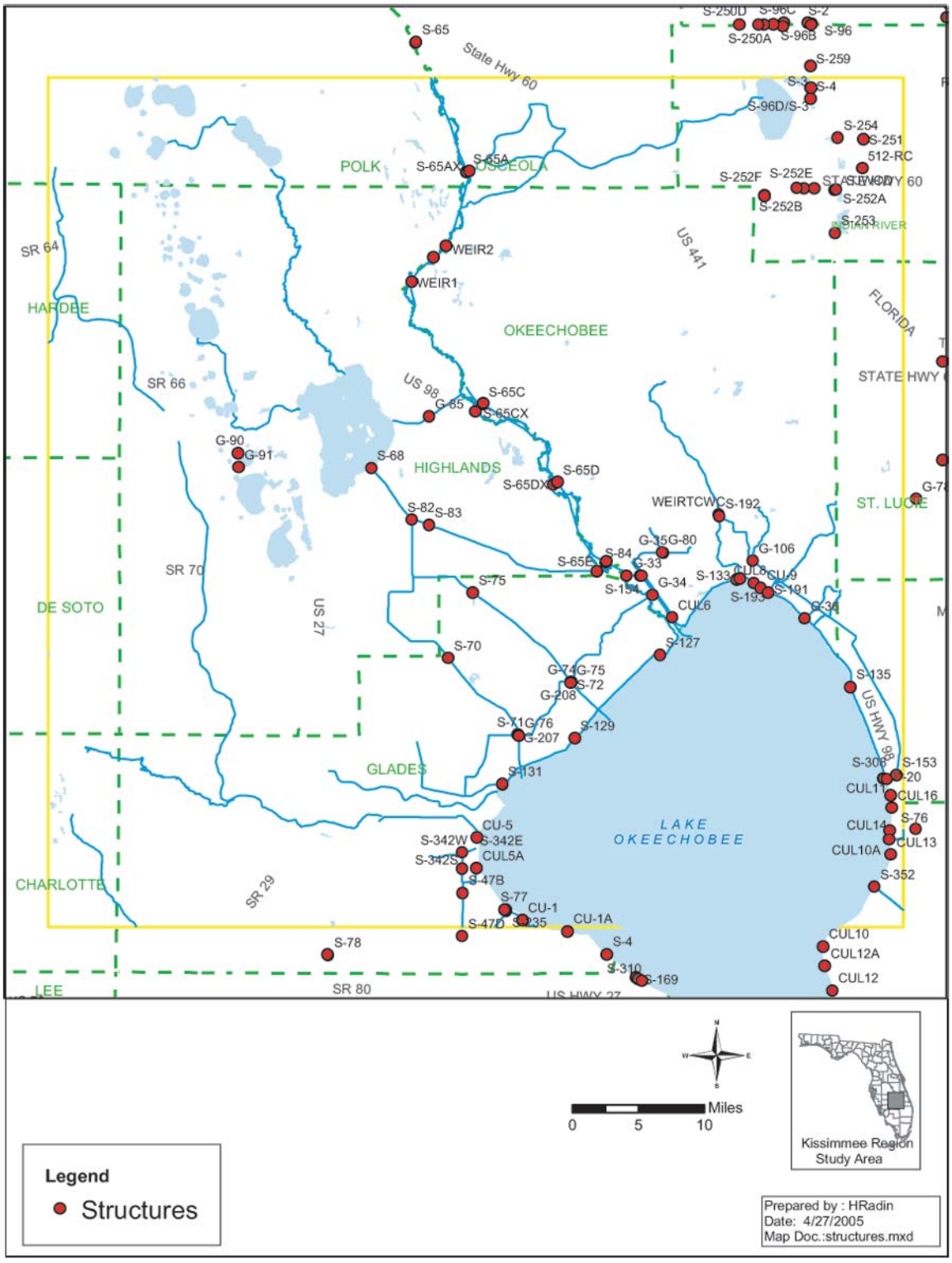

Figure 6. Major District Structures.

The model area contains numerous small lakes with little or no data available about them. For modeling purposes only those lakes over 30 acres were included.

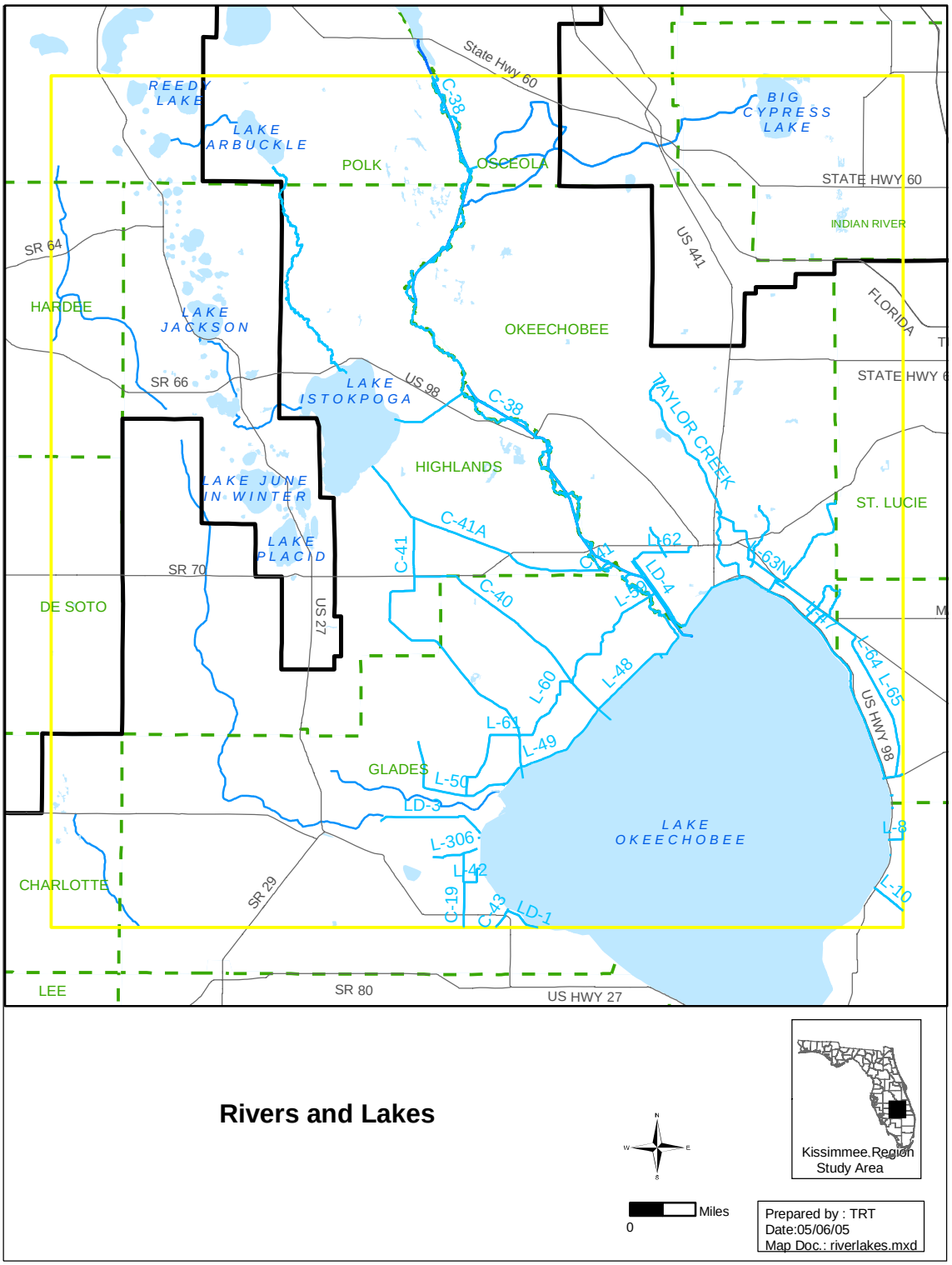

Figure 7. Rivers and Lakes Simulated in the Lower Kissimmee Groundwater Basin.